Finance Section 2: Simple Interest, Compound Interest, APR, Future Value, Effective Rate

Goals:

- How to use formulas for Simple Interest over Time and Annual Percentage Rate compounded at various frequencies.
- Comparing how different interest rates and compounding frequencies compare to each other.
- Understand the difference between APY and the Effective Annual Interest Rate (EAR).

1. Simple One-Time Interest

   (a) Suppose Liz borrows \$1000 and agrees to pay it back in a year with 5% simple interest.

      i. How much **interest** will she pay?

      ii. How much will she owe in total at the end of the year?

   (b) Suppose a loan is obtained under the conditions of simple one-time interest. If P represents the **principal** or **present value** and r represents the interest rate in decimal form, write a formula for interest, I.

   (c) Under the conditions above, write a formula for the end amount, A, also called the **future value** of load.

2. Simple Interest over Time

   (a) Suppose Liz gets a \$1000 load with 5% simple interest assessed annually.

      i. How much **interest** will she pay *if she pays it back in 6 months*?

      ii. How much **in total** will she pay *if she pays it back in one year and 3 months*?

   (b) Suppose a loan is obtained under the conditions of simple interest over time. If P represents the **principal** or **present value**, r represents the annual interest rate in decimal form, t represents time as measured in years, write a formula for interest, I.

   (c) Under the conditions above, write a formula for the end amount, A, also called the **future value** of load.

3. Annual Percentage Rate (APR) compounded at various frequencies.

   (a) Suppose a savings account advertises an annual percentage rate of 7% compounded semiannually with a $5000 minimum balance. Assuming a minimum balance, how much money would this account have (assuming no additional deposits and no withdrawals) after

      i. 6 months

      ii. 1 year

      iii. 10 years

      iv. **For each of the time periods above**, determine the interest accumulated and, then, the percent of return. (This is called the Effective Annual Interest Rate or EAR.) What do you notice?

(b) Suppose a different account offers 6.9% compounded daily with a $5000 minimum balance. Again assuming a minimum deposit, no additional deposits and no withdrawals, how much would this account have after 10 years? What do you observe?